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RESPONSE TO EPA'S TECHNICAL REVIEW COMMENTS DATED AUGUST 17, 2005

FINAL RCRA FACILITY INVESTIGATION REPORT

SHELL CHEMICAL YABUCOA, INC.

YABUCOA, PUERTO RICO

February 15, 2007

SPECIFIC COMMENTS

Section 2.9, Site-Specific Hydrogeology, Pages 2-15 and 2-16

1. The second full paragraph on page 2-15 states that groundwater levels in wells adjacent to Lajas Creek were higher than surface water levels in September 1996 and January 1997, and that groundwater was discharging to surface water. A review of data presented in Tables 2-5 and 4-3, however, indicates that this was not the case. According to Table 2-5, Lajas Creek staff gauge SG-4 reported the water level at 10.98 feet above mean sea level (ft amsl) in September 1996. According to Table 4-3, September 1996 water levels in monitoring wells 40-10 and 40-12 (adjacent to staff gauge SG-4) were reported at 9.73 and 9.04 ft amsl, respectively. These measurements depict groundwater levels lower than adjacent surface water levels, resulting in flow of surface water from Lajas Creek to groundwater. Although the water level at staff gauge SG-4 in January 1997 was reported at 8.44 ft amsl (lower than the creek and groundwater levels measured in September 1996), no groundwater level measurements are available from January 1997 for comparison with the staff gauge data. Based on these data, the discussion on groundwater and surface water interaction shall be revised to indicate surface water flow into the aquifer from both Lajas and Santiago Creeks in September 1996. Data from the 2003 and 2004 water level measurement events appears to have been correctly interpreted and require no such revision.

Response: The groundwater and surface water interconnection discussion in Section 2.9 and Table 2-6 of the RFI report were revised to address EPA's comments and to provide additional clarification. It should be noted that Table 4-3 discussed in EPA's comment describes water level data from September 1, 1996, which are not synoptic with the surface water level measurements on September 28, 1996 shown in Table 2-5. As discussed in the original and revised text, the correct comparison is between groundwater water level data and surface water data for September 28 as presented in Tables 2-3 and 2-5, respectively.

Section 3.0, Field Investigation Procedures

2. In response to EPA comments dated November 3, 1998 (General Comment 5), SCYI prepared a discussion on the purpose of immunoassay field screening and the correlation between immunoassay and full chemical analysis results. Revised sections of the Draft RFI Report including this discussion were provided with the facility response to comments dated March 9, 1999, and subsequently approved by EPA. However, this discussion was not included in the Final RFI Report. Because immunoassay field screenings were completed as part of the RFI, and because associated data are included in the RFI Report, this discussion shall be added to the subject report.

Response: The discussion concerning field screening, including immunoassay, from the facility's March 9, 1999 response to EPA's November 3, 1998 technical review has been added to the RFI report as new Section 5.1.3.

Section 3.2, Monitoring Well Installation Procedures, Page 3-2

3. The first paragraph in this section indicates that the majority of monitoring wells installed during the 1996 RFI work were installed as temporary monitoring points. Well construction logs for the three permanently installed wells are provided in Appendix E of the RFI Report. It would also be useful to know additional construction details for the temporary wells (e.g., were the wells sand packed and sealed). The discussion shall be revised accordingly.

Response: Section 3.2 of the RFI Report has been updated to provide additional discussion concerning the construction details of the temporary monitoring wells.

Section 3.4, Analytical Methods and Quality Assurance/Quality Control, Pages 3-5 and 3-6

4. As indicated at the bottom of page 3-5, surface water and sediment samples were collected as part of the 2003 Supplemental RFI field work. The surface water samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), base/neutral acid extractable compounds (BNAs), and Modified Skinner List (MSL) metals. The sediment samples were analyzed for VOCs and polycyclic aromatic hydrocarbons. According to the last sentence in this section, all of the Supplemental RFI data (presumably including the surface water and sediment results) were validated by Premier Environmental, Inc., and Rafael Infante, a certified chemist in Puerto Rico. However, data validation reports for these samples are not included with or referenced in Appendix J. To document usability of the data for decision-making purposes, data validation reports for the surface water and sediment samples must be added to the RFI Report.

Response: Data validation reports for the surface water and sediment samples have been referenced in and added to Appendix J.

Section 5.7, Dewatering Chamber (SWMU 38), Page 5-21

5. To further explain the sampling locations selected for SWMU 38, this section shall be expanded to clarify that the objective of the soil and groundwater sampling program was to evaluate any potential environmental impacts from an apparent surface spill located southwest of the dewatering chamber. Also note that sampling locations were based on the distribution of surficial staining in this area, as stated in the March 9, 1999 response to EPA's November 3, 1998 comments on the RFI Report (Specific Comment 11).

Response: Sections 5.7 and 5.7.1 have been revised to clarify the sampling objective and selection of sampling locations.

Section 5.11.4, Conclusions (SWMU 3 – East API Separator), Page 5-43

6. The first paragraph in this section states that, although methylene chloride was reported in SWMU 3 soil above the migration to groundwater risk-based screening level (RBSL), this constituent has not been detected in downgradient groundwater. A comparison between Figures 5-15 and 5-16 shows no SWMU 3 wells downgradient of boring location 3-03. This section shall be revised to make specific reference to the downgradient wells (e.g., East Aisle Drainage [SWMU 45] wells 45-01 and 45-02, Barge Dock Sump Area [SWMU 34] wells) used in determining that methylene chloride contamination in soil at SWMU 3 has had no significant impact on groundwater.

Response: Section 5.11.4 has been revised to make specific reference to downgradient wells with respect to methylene chloride in subsurface soil above its migration to groundwater RBSL.

Section 5.16.4, Conclusions (SWMU 33 – Main Dock Sump), Page 5-64

7. The third paragraph on this page indicates that impacted groundwater in the vicinity of well MDS-4 is contained within the capture zone of groundwater depression wells MDS-9R and MDS-10R. However, SCYI indicated in a letter to EPA in September 2004 that use of groundwater depression pumps at the Main Dock Sump (MDS) has been discontinued. According to the letter, this change was implemented at EPA's request and is expected to remain in place until the facility's National Pollutant Discharge Elimination System permit can be modified to include discharge from the pumps or until final corrective remedies are put into place. The letter also provides documentation showing that cessation of pumping has not impacted recovery of free product hydrocarbon (FPH) on the water table. The RFI Report shall be modified to present the current status of pumping activity at SWMU 33. Furthermore, in the absence of pumping, impacted groundwater flows toward the Caribbean Sea Inlet. Consequently, the RFI report shall be revised to indicate that groundwater and surface water quality will continue to be monitored pending implementation of final corrective measures.

Response: Section 5.16.4 has been revised to indicate the current status of the pumping activity at the Main Dock Sump (SWMU 33) and additional sampling. As discussed during a meeting with EPA on March 29, 2006 and in a letter from Sunoco on April 10, 2006, additional work activities, including sediment sampling at the Main Dock Sump will be performed as part of the upcoming Corrective Measure Study as detailed in Module III of the facility's RCRA permit.

Section 6.3, Residual Petroleum Product, Page 6-6

8. Interim measures have been implemented to monitor and recover FPH on the water table at SWMUs 3, 33, 34, 40, 43, and 45. To support SCYT's contention in this section that the FPH plumes are "stable or shrinking", FPH tables throughout Section 5 shall be expanded to include all available thickness measurements, rather than only those collected in 1996 and 1997. In addition, as requested in EPA's previous comments on the 1997 Draft RFI Report, the document shall also be expanded to include FPH thickness maps developed using historical data (i.e., 1996 and 1997 measurements) to allow for assessment of changes in plume footprint and extent over time.

Response: Available FPH data from July 1996 to April 2006 for the Northeast Refinery Area (SWMU 40), East API Separator (SWMU 3), Watery Oil Separator (SWMU 43), East Aisle Ditch (SWMU 45), Main Dock Sump (SWMU 33), and Barge Dock Sump (SWMU 34) are presented in Tables 5-54, 5-79, 5-88, 5-109, 5-113, and 5-127, respectively. Corresponding maps showing the FPH footprint for the six SWMUs during 1997, 2001, and 2005 are presented in Figures 5-12A through 5-12C, Figure 5-17A through 5-17C, Figures 5-20A through 5-20C, Figures 5-26A through 5-20C, Figures 5-28A through 5-28C, and Figures 5-32A through 5-32C. The corresponding text in Sections 5.9, 5.11, 5.12, 5.15, 5.16, and 5.17 concerning FPH observations has been updated to address the expanded data and additional figures.

Table 6-1, Chemical and Physical Characteristics of Constituents of Concern

9. This table shall provide chemical and physical characteristics for all constituents reported at concentrations exceeding RBSLs in soil (surface and subsurface), groundwater, surface water, and sediment. Accordingly, expand the table to also include methylene chloride, chromium, nickel, and selenium.

Response: Table 6-1 has been revised to include methylene chloride, chromium, nickel, and selenium.

Section 7.2.1, Soil Pathway, Pages 7-5 and 7-6

10. The RFI Report states that, where exposures to contaminated soil may occur, the risks are "within the EPA acceptable range of 10^{-4} to 10^{-6} ." However, the report does not explain how the risks were quantified for comparison against acceptable excess risk ranges. IF human health risk calculations are to be performed, additional information will be

required to further quantify actual risks and provide further justification for determining that risks are acceptable. Any human health risk assessment will have to be performed according to EPA's appropriate risk assessment guidance, which can be provided should such an assessment be required. In addition, SCYI shall ensure that *cumulative* risks and hazards have been considered for all receptors across all media and pathways. If contamination is found to be present at the facility above appropriate screening levels, then a Human Health Risk Assessment (HHRA) may need to be prepared according to current EPA guidance. The HHRA does not need to be part of the RFI and can be conducted upon completion of the RFI.

Response: As per EPA's cover letter to the August 17, 2006 technical review, discussions of, and conclusions related to, any risk assessments, except for comparing current RFI data with appropriate and accepted screening levels, have been removed from the RFI Report.

Section 7.2.2, Groundwater Pathway, Page 7-9

11. In the last sentence in this section, SCYI indicates that risks associated with on-site construction worker direct contact exposure to FPH are not a concern because this receptor follows site health and safety guidelines and uses appropriate personal protective equipment (PPE). Consideration of PPE use is acceptable when evaluating whether risks are expected to be significant for purposes of the CA725 Environmental Indicator determination. However, given that this risk assessment was prepared to support final remedy decisions (including No Further Action determinations), the report must include a quantitative assessment of risk and hazards associated with direct exposure to FPH areas. The use of PPE to reduce or potentially mitigate exposure can then be discussed in an uncertainty discussion associated with the calculation. Revise the RFI Report accordingly.

Response: Section 7.2.2 has been revised to expand the discussion concerning construction worker exposure to FPH.

Section 7.2.4, Air Pathway, Pages 7-13 and 7-14

12. The fourth paragraph in this section discusses an occupied building north of the Main Dock Sump (SWMU 33). Because the building is located upgradient of impacted groundwater in this area, the report acceptably concludes that indoor air exposures are not a concern for occupants of this building. However, no other buildings at the facility have been assessed or discussed. Revise the report to address all buildings above and downgradient of potential VOC impact areas, or specifically state that no other occupied buildings are present in these areas.

Response: Section 7.2.4 of the RFI Report has been revised to provide additional information concerning building locations with respect to indoor air exposures.

13. The discussion on transport pathways indicates that windblown dust is not a significant concern at SCYI due, in part, to the presence of grassy areas at SWMUs where contaminated surface soil has been identified above RBSLs. Because SCYI is using this assertion to eliminate a potential risk pathway, figures showing SWMUs with surface soil concerns shall be revised to specify the location of these grassy areas in relation to RBSL exceedances.

Response: No contamination above outdoor air screening levels for inhalation of fugitive dust occurs in soil at any of the SWMUs. Therefore, there is no exposure. Section 7.2.4 of the RFI Report has been revised accordingly.

Section 8.0, Findings and Conclusions, Page 8-8

14. Although many of the recommendations in the RFI Report appear to be acceptable, an expanded groundwater monitoring program will be necessary. In addition to ongoing monitoring at the Main Dock Sump (SWMU 33), groundwater quality shall be monitored at SWMUs 17, 34, and 40 to evaluate concentration trends and potential downgradient migration of groundwater that exceeds RBSLs. Both source area and downgradient sentinel wells (e.g., BDS-2 and BDS-1, respectively) shall be included in the sampling program. This information should be part of a long-term monitoring plan which is normally part of a CMI. As long as groundwater contaminants remain above the appropriate groundwater standards, a comprehensive long-term groundwater monitoring plan will be required. This plan shall be part of any final corrective action selected for this facility. Such a plan should identify the wells to be sampled, parameters to be analyzed and frequency of sampling events.

Response: The groundwater quality at the Main Dock Sump (SWMU 33) will continue to be evaluated as part of ongoing monitoring activities. Additionally, groundwater sampling will be performed at SWMUs 17, 34, and 40 on a semiannual basis as discussed in Sections 5.4.4, 5.9.4, and 5.17.4. The work will be performed as per the facility's RCRA permit requirements.

ATTACHMENT # 2

Corrections to the Final RFI Report, March 2005

Comment	Section	Page	Correction
1	General		<p>Revise the RFI Report as needed to consistently include laboratory data qualifiers when presenting analytical results in the text, tables, and figures.</p> <p>Response: The RFI Report has been revised to ensure consistency between text, tables, and figures with respect to laboratory data qualifiers.</p>
2	Section 2.1, Facility Location, Second Paragraph	2-1	<p>Reference Figure 5-1 for a map showing SWMU locations around the facility. Alternatively, expand Figures 2-3 through 2-5 to show the location of all 16 SWMUs being addressed in the RFI Report, along with the specific name and number designation for each.</p> <p>Response: Section 2.1 includes a reference to Figure 5-1, which shows SWMU locations.</p>
3	Section 3.2, Monitoring Well Installation Procedures	3-3	<p>Revise the first full paragraph on this page to reference Table 4-1 for well construction <i>details</i>, rather than well construction <i>diagrams</i>.</p> <p>Response: Section 3.2 has been revised to reference Table 4-1 for well construction details, rather than well construction diagrams.</p>
4	Section 5.9.4, Conclusions (SWMU 40), Second Sentence	5-34	<p>Expand this sentence to also indicate that selenium was reported in soil samples above applicable RBSLs.</p> <p>Response: Section 5.9.4 has been expanded to indicate that selenium was reported in soil samples above applicable RBSLs.</p>

Comment	Section	Page	Correction
5	Section 5.11.3, Results (SWMU 3)	5-41	<p>Correct the second sentence to state that methylene chloride was detected above the migration to groundwater RBSL in the subsurface soil sample collected from 3–3.5 ft below ground surface (bgs) at sampling location 3-03. Correct the third sentence to state that methylene chloride was reported below the RBSL in the soil sample collected at 8–8.5 ft bgs at location 3-03. According to Table 5-70, the subsurface soil sample collected at location 3-01 reported methylene chloride as non-detected.</p> <p>Response: Section 5.11.3 concerning methylene chloride detections at sampling location 3-03 has been corrected.</p>
6	Section 5.17.3, Results (SWMU 34)	5-67	<p>There is some discrepancy throughout the RFI Report as to the level of 2-methylnaphthalene detected in subsurface soil sample location 34-04 (7.5–8 ft bgs). A value of 110,000 micrograms per kilogram ($\mu\text{g/kg}$) is reported in the second paragraph of this section and in Table 7-2. However, Sections 7.2.1 and 8.0 and Tables 5-120 and 7-3 indicate a detected level of 100,000 $\mu\text{g/kg}$. A review of the data validation reports in Appendix J (report BQO800-836BNAs) clarifies that the actual validated result was 110,000 $\mu\text{g/kg}$. Correct the RFI Report as needed to eliminate these inconsistencies.</p> <p>Response: The discrepancy in Sections 7.2.1 and 8.0 concerning the concentration of 2-methylnaphthalene (110,000 $\mu\text{g/kg}$) at sample location 34-04 (7.5–8 ft bgs) has been corrected.</p>
7	Section 5.17.3, Results (SWMU 34), Second Paragraph	5-67	<p>Revise this paragraph to indicate that 2-methylphthalate was detected above the migration to groundwater RBSL at subsurface soil sampling locations 34-04, 34-05, and 34-06 (all at a depth of 7.5–8 ft bgs), as presented in Table 5-120 of the RFI Report. These exceedances shall also be noted in Section 7.2.1 (page 7-4).</p> <p>Response: Sections 5.17.3 and 7.2.1 have been revised to indicate that 2-methylnaphthalene exceeded its migration to groundwater RBSL at subsurface soil sampling locations 34-04, 34-05, and 34-06 (all at a depth of 7.5–8 ft bgs).</p>

Comment	Section	Page	Correction
8	Section 5 Tables – SWMU 43		<p>The data summary appears to have been inadvertently omitted for metals in surface soil at SWMU 43. Provide this summary in the revised RFI Report.</p> <p>Response: The surface soil at location 43-03 of SWMU 43 was not sampled for BNAs and metals. The surface soil was sampled for VOCs, however. Further discussion is provided in Section 5.12 of the RFI Report.</p>
9	Section 5 Figures		<p>Revise these figures to provide actual analytical data, rather than simply an indication that no exceedances were reported, so that trends in contaminant concentrations can be identified. Furthermore, revise the figures to ensure that all exceedances are highlighted as indicated.</p> <p>Response: As agreed with EPA during a March 29, 2006 meeting, no revision to the figures is necessary. Existing figures that show exceedances of RBSLs are acceptable.</p>
10	Section 6.1, Organic Constituents	6-2	<p>Expand the second full paragraph on this page to include acetone and di-n-butyl phthalate as additional constituents exceeding their respective ecological screening levels in surface soil at SWMU 40, as per data provided in Table 7-7.</p> <p>Response: The text in Section 6.1 has been expanded to include mention of acetone and di-n-butyl phthalate as exceeding ecological screening levels. The text in Sections 6.1 and 6.2 has also been updated to mention all constituents that exceeded respective screening levels.</p>
11	Section 7.2.1, Soil Pathway, Fifth Paragraph	7-3	<p>This paragraph incorrectly states that RBSLs for migration to groundwater were not exceeded in surface soil at any SWMU. Correct this statement to indicate that, as shown in Table 7-3, chromium and nickel were reported above their respective migration to groundwater RBSLs in surface soil at SWMU 40.</p> <p>Response: Section 7.2.1 has been corrected to indicate that chromium and nickel were reported above their respective migration to groundwater RBSLs in surface soil at SWMU 40.</p>

Comment	Section	Page	Correction
12	Section 7.2.2, Groundwater Pathway	7-7	<p>Clarify the last sentence in the first full paragraph on this page to indicate that there are no <i>drinking water</i> receptors. Also, correct the listed screening level for naphthalene (6.5 micrograms per Liter [ug/L], according to various tables in the RFI Report).</p> <p>Response: Section 7.2.2 has been clarified with respect to drinking water receptors and corrected with respect to the naphthalene groundwater screening level. Note that the Region 9 tap water PRG for naphthalene is 6.2 ug/L.</p>
13	Section 7.3.2.2, Selection of Constituents of Potential Ecological Concerns	7-28	<p>Correct the last paragraph on this page to state that arsenic was detected at a concentration of 5.4 B ug/L in groundwater at the Main Dock Sump (SWMU 33).</p> <p>Response: Sections 5.16.3 (Groundwater investigation results), 7.3.2.2 (ESLs for saltwater water), and 7.3.2.3 (Constituents of potential ecological concern - surface water) have been revised to address this comment. As discussed in Section 5.1.2, the PREQB arsenic surface water screening standard of 1.4 ug/L relates to protection of human health due to fish consumption rather than to ecological protection of aquatic life,</p>

Comment	Section	Page	Correction																																												
14	Section 7 Tables		<p>Inconsistencies have been identified between data presented in Section 5 data tables and Section 7 detection and exceedance summaries. Verify the data are correct, and make the following edits to Section 7 tables.</p> <p><u>Table 7-1, Maximum Detections in Surface Soil</u></p> <table><tr><td>SWMU 45</td><td>2-methylnaphthalene</td><td>100 J ug/kg</td></tr></table> <p><u>Table 7-2, Maximum Detections in Subsurface Soil</u></p> <table><tr><td>SWMU 3</td><td>Phenanthrene</td><td>1,300 ug/kg</td></tr><tr><td>SWMU 34</td><td>Fluorene</td><td>7,900 J ug/kg</td></tr><tr><td></td><td>Phenanthrene</td><td>13,000 ug/kg</td></tr><tr><td></td><td>Pyrene</td><td>1,300 J ug/kg</td></tr><tr><td>SWMU 35</td><td>Vanadium</td><td>137 milligrams per kilogram (mg/kg)</td></tr><tr><td>SWMU 39</td><td>Lead</td><td>5 mg/kg</td></tr><tr><td>SWMU 40</td><td>Xylene</td><td>130 ug/kg</td></tr></table> <p><u>Table 7-3, Detections in Surface and Subsurface Soil Above RBSLs</u></p> <p>Reference the Watery Oil Separator as SWMU 43, rather than SWMU 83.</p> <p>Revise the header row to reference the first two columns as Surface and Subsurface Soil <i>Direct Contact</i> Exceedances.</p> <table><tr><td>SWMU 3</td><td>Benzo(a)pyrene</td><td>03-08 Surface Soil</td><td>230 ug/kg</td></tr><tr><td></td><td>Methylene Chloride</td><td>03-03 Subsurface Soil</td><td>48 ug/kg</td></tr><tr><td>SWMU 34</td><td>Arsenic</td><td>34-08 Subsurface Soil</td><td>2.7 J mg/kg</td></tr><tr><td></td><td>2-methylnaphthalene</td><td>34-05 Subsurface Soil</td><td>35,000 ug/kg</td></tr><tr><td></td><td>2-methylnaphthalene</td><td>34-06 Subsurface Soil</td><td>31,000 ug/kg</td></tr></table>	SWMU 45	2-methylnaphthalene	100 J ug/kg	SWMU 3	Phenanthrene	1,300 ug/kg	SWMU 34	Fluorene	7,900 J ug/kg		Phenanthrene	13,000 ug/kg		Pyrene	1,300 J ug/kg	SWMU 35	Vanadium	137 milligrams per kilogram (mg/kg)	SWMU 39	Lead	5 mg/kg	SWMU 40	Xylene	130 ug/kg	SWMU 3	Benzo(a)pyrene	03-08 Surface Soil	230 ug/kg		Methylene Chloride	03-03 Subsurface Soil	48 ug/kg	SWMU 34	Arsenic	34-08 Subsurface Soil	2.7 J mg/kg		2-methylnaphthalene	34-05 Subsurface Soil	35,000 ug/kg		2-methylnaphthalene	34-06 Subsurface Soil	31,000 ug/kg
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SWMU 39	Lead	5 mg/kg																																													
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14 continued	Section 7 Tables (continued)		<p><u>Table 7-4, Maximum Detections in Subsurface Soil</u></p> <p>Note that this table includes only detections from the most recent round of sampling at each well.</p> <table><tr><td>SWMU 2</td><td>Carbon disulfide</td><td>15 ug/L</td></tr><tr><td></td><td>2-methylnaphthalene</td><td>ND</td></tr><tr><td></td><td>Naphthalene</td><td>ND</td></tr><tr><td></td><td>Phenanthrene</td><td>ND</td></tr><tr><td>SWMU 3</td><td>Phenanthrene</td><td>ND</td></tr><tr><td>SWMU 33</td><td>Acetone</td><td>3 J ug/L</td></tr><tr><td></td><td>bis(2-chloroethyl)ether</td><td>2 ug/L</td></tr><tr><td>SWMU 34</td><td>Toluene</td><td>0.3 J ug/L</td></tr><tr><td>SWMU 40</td><td>Acenaphthene</td><td>1.3 J ug/L</td></tr><tr><td></td><td>Vanadium</td><td>7.5 B milligrams per liter (mg/L)</td></tr><tr><td>SWMU 43</td><td>Barium</td><td>121 B mg/L</td></tr><tr><td>SWMU 45</td><td>Carbon disulfide</td><td>ND</td></tr><tr><td></td><td>bis(2-chloroethyl)ether</td><td>2 ug/L</td></tr></table> <p><u>Table 7-7, Maximum Concentrations of VOCs, BNAs, and Metals in Surface Soil</u></p> <table><tr><td>SWMU 36</td><td>Lead</td><td>43.9 J mg/kg</td></tr><tr><td>SWMU 40</td><td>Phenol</td><td>57 J ug/kg</td></tr><tr><td></td><td>Nickel</td><td>233 mg/kg</td></tr></table> <p>Response: Inconsistencies between data presented in Section 5 data tables and Section 7 detection and exceedance summaries have been corrected.</p> <p>Certain typographical errors were corrected in the groundwater data tables of Section 5 as follows. Bis(2-chloroethyl)ether in groundwater at well 45-09 (Table 5-106) is now reported as 11 U ug/L. Bis(2-chloroethyl)ether in groundwater at well MDS-4 (Table 5-111) is now reported as 2 U ug/L. Dibenzofuran at well MDS-4 (duplicate) sampled in June 2003 is now reported as 5 U ug/L. Since bis(2-chloroethyl)ether and dibenzofuran are now reported as non-detect at all SWMUs, they have been removed from Table 7-4. Groundwater sample BNA results for well 40-12, which were inadvertently omitted from the previous document, are now included in Table 5-51. Since 4-methylphenol was detected at well 40-12, the detection was added to Table 7-4.</p>	SWMU 2	Carbon disulfide	15 ug/L		2-methylnaphthalene	ND		Naphthalene	ND		Phenanthrene	ND	SWMU 3	Phenanthrene	ND	SWMU 33	Acetone	3 J ug/L		bis(2-chloroethyl)ether	2 ug/L	SWMU 34	Toluene	0.3 J ug/L	SWMU 40	Acenaphthene	1.3 J ug/L		Vanadium	7.5 B milligrams per liter (mg/L)	SWMU 43	Barium	121 B mg/L	SWMU 45	Carbon disulfide	ND		bis(2-chloroethyl)ether	2 ug/L	SWMU 36	Lead	43.9 J mg/kg	SWMU 40	Phenol	57 J ug/kg		Nickel	233 mg/kg
SWMU 2	Carbon disulfide	15 ug/L																																																	
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SWMU 34	Toluene	0.3 J ug/L																																																	
SWMU 40	Acenaphthene	1.3 J ug/L																																																	
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ATTACHMENT # 3

TECHNICAL REVIEW

FINAL RCRA FACILITY INVESTIGATION REPORT SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT (SLERA)

SHELL CHEMICAL YABUCOA, INC. YABUCOA, PUERTO RICO

Based on our review, we believe it is premature to include a risk assessment in the RFI at this stage. All discussions on risk should be removed from the RFI except for comparing current RFI data with appropriate and accepted screening levels. The purpose of the RFI is to delineate the nature and extent of contamination. The facility may submit a separate risk assessment upon completion of the RFI if necessary. Comments on the SLERA below and on various other risk issues encountered throughout the document are for future references only.

Upon completing the review of the Screening Level Ecological Risk Assessment (SLERA), EPA has determined that, in general, the SLERA adequately follows EPA guidance. However, there are concerns about the lack of risk evaluation in some of the ecologically relevant areas of the site; the risk evaluation for special status species; the lack of an uncertainty analysis, and the soil screening values used in the SLERA. Specific details on these concerns are provided in the comments below.

GENERAL COMMENTS

1. The SLERA does not currently include an adequate assessment of uncertainty. The SLERA should be revised to identify the major sources of uncertainties with the SLERA, including a qualitative discussion of uncertainties in media sampling completeness and representativeness (i.e., nature and extent of contamination), exposure estimates, and ecological screening values used. Refer to EPA's *Ecological Risk Assessment Guidance for Superfund* (ERAGS, June 1997, EPA 540-R-97-005) for more guidance on uncertainty analysis in the context of a SLERA.

Response: As requested by EPA during a March 29, 2006 meeting, all discussions on risk were removed from the RFI Report, except for comparing current RFI data with appropriate and accepted screening levels. Consequently, an assessment of uncertainty for ecological risk is not warranted at this time.

2. The SLERA does not indicate whether SCYI has consulted with the U.S. Fish and Wildlife Service (USFWS), Southeast Region, concerning threatened and endangered (T&E) species within a one-mile radius of the site. The report references a 2002 National Oceanic and Atmospheric Administration (NOAA) list of T&E species, but most USFWS offices will perform a current database search of a specific site upon request. The RFI

Report shall specifically confirm that SCYI requested a USFWS T&E database search and received a letter verifying the lack of T&E species or critical habitat.

Response: A consultation by the USFWS and NOAA was requested to perform a current database search of T&E species and critical habitats within a one-mile radius of the site. The results are discussed in Section 7.3.1 of the RFI Report.

3. The SLERA is lacking essential supporting figures, including site conceptual exposure models (SCEMs) and food web models. The SCEM, as depicted in Appendix B, Figure B-1 of ERAGS, is a figure that presents, in a clear and concise manner, all current and potential future impacted media, transport mechanisms, routes of exposure and receptors. The SLERA shall be revised to include a separate SCEM figure for each solid waste management unit (SWMU), SWMU grouping and/or potentially-impacted areas (e.g., Lajas Creek, Main Dock Sump, etc.) evaluated for ecological risk. Similar documentation (i.e., SCEMs) shall be provided with regard to human health risks and concerns.

A food web, as depicted in Figures 4-1 thru 4-7 (pp. 4-15 thru 4-21) of EPA's 1999 *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities*, illustrates the movement and potential biomagnification of contamination from exposure media through various trophic levels to the indicator receptor or assessment endpoint. The SLERA shall be revised to include food webs for each of the SWMU groupings and/or areas of ecological interest.

Response: As requested by EPA during a March 29, 2006 meeting, all discussions on risk were removed from the RFI Report, except for comparing current RFI data with appropriate and accepted screening levels. Consequently, site conceptual models and food web models are not warranted at this time.

4. The SLERA shall be expanded to indicate how non-detected constituents were evaluated in terms of ecological risks. EPA guidance very clearly states that *"if a screening level risk assessment indicates that adverse ecological effects are possible at environmental concentrations below the standard quantitation limits, a "non-detect" based on those limits cannot be used to support a no-risk decision"* (EPA's Guidelines for Ecological Risk Assessment, 1998). However, there is no indication that SCYI compared detection limits for non-detected constituents to ecological screening levels to evaluate protectiveness. Results of this screening shall be included in the uncertainty analysis.

Response: A evaluation of non-detected constituents in terms of ecological screening levels is provided in Section 7.3.2.4.

5. The RFI Report highlights a study conducted 23 years ago that concluded there were no adverse impacts from refinery operations. Ecological science has changed and advanced significantly since the referenced study was conducted. Site conditions have also likely changed over the past 23 years. The RFI Report shall indicate whether any more recent

ecological studies have been conducted at SCYI, and shall attempt to assess the usability of the previous study and its conclusions based on current ecological risk assessment practices and standards. Alternatively, the information relating to, and conclusions from, the 23 year-old study shall be deleted from the RFI Report.

Response: Information relating to, and conclusions from, the 23 year-old study were deleted from the RFI Report.

SPECIFIC COMMENTS

Section 7.3.1.1, Ecological Setting, pages 7-21 to 7-22

1. Based on the discussion provided, it appears that the West Indian manatee is the only special status species expected to be present at any of the SWMUs or adjacent areas potentially affected by chemical transport from the SWMUs. The text, however, is somewhat unclear on this point, and Figure 7-2 is illegible. This section shall be revised to clarify which special status species may be present in areas potentially affected by site contamination. This information is important because the presence of special status species often affects the receptors and assessment endpoints selected for evaluation, as well as the toxicity reference values used in the SLERA.

Response: Section 7.3.1 provides a clarification of special status species that may be present in areas potentially affected by site contamination. Additionally, Figure 7-2 has been updated to provide better legibility (see also the response to Specific Comment 9).

Section 7.3.1.3, Exposure Pathways and Potential Receptors, pages 7-22 to 7-23

2. This section lists the media and areas of concern for the SLERA, but does not provide the rationale for excluding a number of potentially important areas of ecological concern. For example, no discussion regarding Santiago Creek, the Unnamed Creek, or the wetlands in and/or adjacent to SWMU 40, the Tank Farm, and the Dock areas is provided. The rationale for excluding areas such as these from evaluation shall be provided. If analyses of contaminant fate and transport have ruled out the possibility of contaminant migration to these areas, then these findings shall be explicitly stated and relevant sections of the RFI shall be referenced.

Response: As requested by EPA during a March 29, 2006 meeting, all discussions on risk were removed from the RFI Report, except for comparing current RFI data with appropriate and accepted screening levels. Accordingly, as discussed in the response to General Comment 3, development of site conceptual models is not warranted at this time.

Section 7.3.1.3, Exposure Pathways and Potential Receptors, page 7-23

3. This section identifies surface water at the Main Dock Sump (SWMU 33) among the media of concern, but does not identify sediment in this area as a medium of concern. It is unclear why sediment has not been considered, particularly because many of the contaminants of interest (e.g., metals, polynuclear aromatic hydrocarbons [PAHs]) are more likely to be present at detectable levels in sediment than in surface water. Discuss the rationale for excluding sediment in this area from evaluation.

Response: As agreed with EPA during a March 29, 2006 meeting, sediment sampling required by the facility's RCRA permit will be performed at the Main Dock Sump (SWMU 33) for the Corrective Measures Study.

Section 7.3.2.1, Ecological Screening Levels, page 7-25

4. SCYI has only used EPA Region 5 ecological screening levels (R5ESLs) as a source of soil screening levels. EPA's recently published Ecological Soil Screening Levels (Eco-SSLs, <http://www.epa.gov/ecotox/ecossl/>) shall be used in preference to EPA Region 5 ESLs, because the methodology used to develop the Eco-SSLs has undergone external peer review and an extensive literature review was conducted in the process of developing the Eco-SSLs. The following decision tree is recommended:
 - For chemicals with Eco-SSLs for one or more endpoints, *including* the mammalian endpoint, the lowest of the Eco-SSL values for all endpoints shall be selected.
 - For chemicals with Eco-SSLs for endpoints *not including* the mammalian endpoint, the lowest value of the available Eco-SSLs and the R5ESLs shall be selected.
 - For chemicals with no Eco-SSLs, the R5ESL shall be selected.

Additionally, a review of Table 7-7 indicates that the R5ESL values listed for metals are incorrect. Values listed are actually in units of $\mu\text{g/kg}$, and must be divided by 1,000 to be converted to units in terms of mg/kg . Section 7.3.2.1, Table 7-7, and other impacted risk characterization and conclusion sections shall be revised accordingly. It is noted that several metals will likely be added as chemicals of potential ecological concern (COPECs) as a result of these revisions.

Response: The RFI Report was revised to employ Eco-SSLs, which are available only for certain metals, according to EPA's decision tree presented above. Table 7-7 shows the rationale for selection of ecological soil screening levels for metals. Table 7-8 shows the ecological soil screening levels for VOCs and BNAs, which were selected from R5ESLs. Units for the metals screening levels were made consistent with media concentrations.

Section 7.3.2.2, Selection of Constituents of Potential Ecological Concern, page 7-28

5. The results of Lajas Creek sampling for volatile organic compounds (VOCs) and base/neutral acid extractable compounds (BNAs) are discussed on p. 7-28. It appears that metals analyses were not conducted on Lajas Creek sediment or surface water samples. Given the prevalence of lead and other metals at refineries, and given the bioaccumulation potential and/or ecosensitivity of lead, copper, mercury and other metals, SCYI shall develop a plan to re-sample Lajas Creek surface water and sediments for metals analyses, or provide justification for omitting these analyses.

Response: As discussed during a meeting with EPA on March 29, 2006 and in a letter from Sunoco on April 10, 2006, additional work activities, including surface water and sediment sampling for metals at Lajas Creek will be performed as part of the upcoming Corrective Measure Study as detailed in Module III of the facility's RCRA permit.

Section 7.3.2.3, Screening Level Risk Calculation, page 7-28

6. SCYI compares the detected concentration of arsenic in Main Dock Sump surface water to background concentrations reported in a dated reference that presumably provides generic surface water data for Puerto Rico. Since site-specific background data are not available, it is not appropriate to calculate a residual environmental exposure concentration (EEC), and additional justification for excluding arsenic from further evaluation is needed. Based on groundwater and soil background investigations and site process knowledge, there appears to be no evidence of an arsenic release at SCYI. The SLERA shall discuss these points, referencing relevant sections of the RFI, to better justify excluding arsenic from further ecological risk evaluation. Discussion regarding the residual EEC shall be deleted from the SLERA. Also, relevant pages of Turekian (1968, as cited in SLERA) shall be included as an attachment to the SLERA.

Response: As requested by EPA during a March 29, 2006 meeting, all discussions on risk, including residual risk, were removed from the RFI Report, except for comparing current RFI data with appropriate and accepted screening levels. However, additional discussion concerning groundwater and soil background investigations and site process knowledge, to justify no evidence of an arsenic release at SCYI is provided in Section 5.16.3 of the RFI Report. Due to copyright restrictions, a copy of the relevant page from Turekian is not provided in the RFI Report as an attachment. However, additional reference information from Turekian (1968) concerning the arsenic background level in seawater is provided in Section 5.16.3 (Surface Water Investigation).

Section 9.0, References, page 9-3

7. The reference section, and the report's approach in some cases, shall be modified to incorporate the following guidance documents:
- USEPA's 1998 *Guidelines for Ecological Risk Assessment*, EPA/630/R-95/002F
 - USEPA's 1999 *Ecological Risk Assessment and Risk Management Principles for Superfund Sites*.

Response: As requested by EPA during a March 29, 2006 meeting, all discussions on risk were removed from the RFI Report, except for comparing current RFI data with appropriate and accepted screening levels. Consequently, incorporation of guidance documents related to determining risk is not warranted at this time.

Table 7-7, Maximum Concentrations of VOCs, BNAs, and Metals in Surface Soil

8. Revise this table to correct R5ESLs for metals, and to incorporate Eco-SSLs. Refer to Specific Comment 4 for a more detailed discussion.

Response: Table 7-7 has been revised to correct R5ESLs for metals, and to incorporate Eco-SSLs.

Figure 7-2, Environmental Sensitivity Index Map

9. This figure is illegible. Please submit a larger version of this figure with the revised RFI Report. Ensure that all areas cited in Table 7-6 are included in this figure.

Response: Figure 7-2 has been updated to address EPA's comment concerning legibility and cross-references to Table 7-6.